DOCUMENT RESUME

ED 347 971 IR 015 707

AUTHOR Applefield, James M.
TITLE ID Knowledge Structure, Lesson Planning, and Teacher Performance.
PUB DATE Feb 92
NOTE 17p.; In: Proceedings of Selected Research and Development Presentations at the Convention of the Association for Educational Communications and Technology and Sponsored by the Research and Theory Division; see IR 015 706. For a related paper, see IR 015 724. Handwritten cognitive maps will not copy well due to filled print.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Mapping; Higher Education; *Instructional Design; *Instructional Systems; Intermediate Grades; Models; *Preservice Teacher Education; Primary Education; Psychological Studies; Questionnaires; Student Teachers; *Teacher Attitudes; *Theory Practice Relationship; Transfer of Training
IDENTIFIERS *Instructional Systems Design; University of North Carolina Wilmington

ABSTRACT

A study was conducted in the teacher training program at the University of North Carolina at Wilmington to explore the degree to which novice teachers apply the concepts, principles, and attitudes of ISD (instructional systems development) in their instructional planning and their beliefs regarding the efficacy of ISD principles for planning and delivering instruction and how they actually apply them. Six preservice teacher interns who had completed a course in instructional design and a course in evaluation completed a cognitive mapping task on teacher planning during the summer prior to student teaching. After student teaching they constructed a second cognitive map and completed a questionnaire on teacher planning. Six additional fall semester interns also completed the questionnaires. Student exit performance was determined by grades in student teaching and by university supervisors' summative evaluation checklists. Qualitative evaluations were used to judge the sophistication of knowledge structure for teacher planning represented in the cognitive maps. It was found that the sophistication and stability of the cognitive maps varied widely, and that there were differences between the patterns of responses of the six interns who taught either a kindergarten or a first grade class and the six who taught in grades 3 through 5. Most of the novice teachers' cognitive maps and self-report data revealed a systematic quality to their planning behavior, and the language of several subjects was consistent with the principles and general process of ISD. Three sample cognitive maps and a data table are attached. (21 references) (BBM)

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED347971

Title:

ID Knowledge Structure, Lesson Planning and Teacher Performance

Author:

James M. Applefield

IR015707

BEST COPY AVAILABLE

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Michael Simonson

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ID Knowledge Structure, Lesson Planning and Teacher Performance

Considerable interest has been expressed recently among professors of instructional design regarding the potential contributions of their field for practicing teachers. Calls for including ID skills in programs of teacher training can be found in various writings (Bielby 1974; Stolovitch, 1980; Earle, 1985; Dick & Carey, 1985; Dick and Reiser, 1989; and Klein, 1991). Several undergraduate programs now include more substantive treatments of instructional design (albeit, adapted for teachers), rather than the very incomplete treatment that typically occurs in preservice teachers' obligatory course in Educational Psychology.

While recommendations for teaching teachers a systems approach to instruction, which would include associated ID concepts, processes and skills, is certainly logically defensible, research to support the efficacy of such an approach in the typical planning routines and subsequent instruction of teachers is lacking. The evidence that does exist is based on the literature of teacher thinking and planning (Yinger, 1979; McCutcheon, 1980; Clark & Peterson, 1986; Brown, 1988), and it consistently indicates that most teachers engage in a planning process that is incongruent with significant aspects of generic ISD models. Teachers do not typically report the use of the linear rational planning model that characterizes models for the systematic design of instruction. Such findings present a challenge to the field of instructional systems design and to those who wish to promote beneficial applications of instructional design principles to preservice and inservice teachers .

In the teacher training program at the University of North Carolina at Wilmington, all students must take a course in instructional design, and a course in evaluation, and earn a grade of C or better in each. The undergraduate ID course teaches a systems approach to instruction using an adaptation of Dick and Carey's ID model, and emphasizing Gagne's taxonomy and events of instruction. Although all students complete the two-course sequence, some variability can be expected among students' cognitive and attitudinal learning outcomes, and in the ways that these learnings are organized and internalized. Satisfactory performance on the discrete intellectual skills and verbal information components of courses may belie possibly serious deficiencies in mastery of the higher level cognitive structure of the course or topic on the part of some students. Such deficiencies may reflect misconceptions within the knowledge structure formed by students, even among those earning the same course grade.

Thus, a course exit task which allows students to represent their own cognitive structure for ID concepts, principles, and relationships may better reveal students' degree of acquisition of the deep structure of the discipline than end-of-course grades (Novak & Gowin, 1984; Jonassen, 1987; Wallace & Mintzes, 1990). Fortunately there are a variety of mapping strategies that have been described and evaluated (Jonassen, Beissner, Kenny, Jost, Reid, & Yacci, 1990; Yacci 1990).

Gaining insight into preservice students' knowledge structures for ISD could improve our understanding of the ways in which they subsequently utilize this knowledge for teacher planning. If there are qualitative differences in students' conceptions of an ISD approach to instruction, they might be related to overall teacher performance.

The following study was conducted to address these questions. First, can preservice teachers' knowledge structure of ISD concepts, principles and attitudes be evaluated? Second, are preservice teachers who have an accurate conceptualization of instructional design (knowledge structure) more likely than those with weak knowledge structures to adopt a process for planning instruction that is more consistent with ISD models? Third, are teachers who implement more elements of ID in their instructional planning judged to be more effective teachers? Fourth,

what do student teachers report about their beliefs regarding the efficacy of ISD principles for planning and delivering instruction and how they actually apply them?

METHOD Subjects were preservice teacher interns at the University of North Carolina at Wilmington. All had completed a course in instructional design and a course in evaluation with a grade of C or better. In the research reported here, Novak and Gowin's (1984) cognitive mapping task has been partially modified (see Strahan's semantic ordered trees, 1989). A recent study by Beyerback and Smith (1990) demonstrated the feasibility of using cognitive mapping tasks to measure changes in preservice teachers' conceptions of broad topics (effective teaching). Subjects were given a set of 27 starter words relating to teacher planning, and a set of 14 linking verbs/ phrases and were asked to create a cognitive map.

STARTER WORDS: attitude, classroom management, events of instruction, formative evaluation, individual differences, individualized instruction, instructional program, instructional strategies, intellectual skills, large group, learning outcomes, lesson plans, mastery learning, mental plans, media, motivation, objectives, remediation, revision, routines, subskills, tests, textbooks, transfer of learning, transitions, unit plans, verbal information.

LINKING VERBS/PHRASES: is subordinate to, is example of, is similar to, is needed for, is based on, takes place when, helps, comes before, occurs simultaneously with, involves, leads to, facilitates, affects, indicates that.

After reviewing examples of 3 cognitive maps and practicing by creating two simple cognitive maps (of dogs and classroom), the interns were asked to prepare a cognitive map for Teacher Planning. Subjects were instructed to use as many or as few of the starter words and linking phrases as they desired and to feel free to add whatever concepts they deemed important to express their conception of teacher planning.

Six students completed a cognitive mapping task on teacher planning during the summer prior to student teaching. After student teaching they constructed a second cognitive map of teacher planning and completed a questionnaire on teacher planning. Six additional fall semester teacher interns also completed the questionnaire. Student exit performance was determined by grades in student teaching and by university supervisors' summative evaluation checklists.

Qualitative evaluations were used to judge the sophistication of knowledge structure for teacher planning represented in the cognitive maps. The following criteria were used: a) number of concepts used, b) number and coherence of items per cluster, c) validity of relationships specified, d) comprehensiveness or number and significance of concepts included/omitted, and e) the narrative statements that accompanied each map.

RESULTS There was considerable variability in the sophistication and stability of the cognitive maps, as well as in the degree of change from pre- to post-administration of the mapping task. Three students' pre-and post-maps have been selected for discussion (see Figures 1, 2 and 3). Maps 1A and 1B reveal a good understanding of the fundamental precepts of instructional systems design. They exhibit good detail and are well organized. Map 1A addresses the relationships among the major aspects of planning and emphasizes individual differences. In map 1B one sees a more streamlined rendition of teacher planning. Classroom management is now portrayed as one of three critical dimensions in planning, along with the dimension of individualized instruction. This map does portray a systematic planning approach and conveys a heightened awareness and urgency regarding the individual learner and the environmental context of learning in schools. Concern for the classroom environment is a salient feature, as expressed

by the statement, "... should be comfortable; children should be able to ask questions and take risks. The class should be success oriented."

In map 2A one finds that a large number of planning concepts have been included, but the relationships among these concepts are not clearly made. The main organizing frame for this map is events of instruction, but it is not entirely clear how this concept is being used. In short, the process of planning is not revealed, nor is there any indication that an instructional systems design model is operating to coordinate thinking about planning. In the post- student teaching map (2B), the dominant organizer of planning concepts has shifted to mental plans. Once again terms are simply classified into groups that share some reasonably common theme. The poor articulation in the supplemental narratives for these maps is consistent with the conclusion that maps 2A and 2B exhibit a much more limited view of teacher planning and give little evidence of an understanding of instructional systems design.

2A: Teacher planning consists of many components. It is important that the instructional program, instructional strategies, lesson plans, mental plans and individual instruction all be a part of the events of instruction. The instructional program should be integrated. If it is integrated the learning outcomes will flow...

2B: Start off with mental plans - big areas of starting off: events of instruction, instructional program, lesson plans, management, revisions and evaluation. Then I have each subdivision broken down with what should be included.

In Maps 3A and 3B we see a highly systematic process of planning and abundant evidence of the application of the essential elements of ISD. The importance of making revisions is a prominent feature of map 3A, as is an apparently greater emphasis on planning for classroom management within the overall context of teacher planning. Map 3B has been transformed into more of a flowchart for planning beginning with global or year-long plans. The revision process continues to be viewed as critical to planning as does the essential contributions of classroom management and learner characteristics (including attitudes and motivation) to planning decisions (instructional strategies, selection of materials and media, and application of events of instruction). This student's narrative reveals the prominence of ISD principles in her approach to planning for instruction as well as the tentative nature of planning for a class of third graders:

> Teacher planning is a complex part of this profession. It is also not something that can be done once and that's it. Planning is a process which often requires revision. New thoughts are generated daily by what you've seen your students do. I found myself constantly questioning my objectives, strategies and evaluation measures to see if I was providing for all children's success in the classroom. After reviewing the state curriculum guide and establishing year long goals, I was then able to generate a six week plan of instruction. My daily plans were then derived from the six weeks plan. I selected my objectives and asked myself questions about expected learning outcomes. Then keeping my students' learning styles in mind, I designed instructional strategies for providing a learning rich lesson. Most of my plans included cooperative learning activities. Following instruction I used the test initially designed in the planning process. If I altered or revised during any stage, my tests also were revised. I constantly tried to transfer the children's knowledge and searched for ways to make this knowledge most meaningful in their lives.

Each student was supervised and evaluated by one of three university faculty members. Five of the student teachers received a grade of 'A' in the student teaching course; the other student received a 'B'. The student teacher whose cognitive maps (2A and 2B) were judged to be least sophisticated received a grade of 'B'. All students were rated excellent in the function of Planning for Instruction. Since there was minimal variability in the ratings and grades of the six teachers, no relationships could be established between these outcome measures and differences detected in the sophistication of cognitive maps.

QUESTIONNAIRE RESULTS There were differences between the patterns of responses of the 6 interns who taught in either a kindergarten or first grade class (kdg-3; 1st- 3), and the 6 interns who taught in the third grade (3), fourth grade (2) or fifth grade (1). Consequently, the average ratings (1-5) for each of the 18 questionnaire items are summarized separately for these two groups. See Table 1.

Teachers in K-1 classes expressed strongest agreement with items: 8 (...mindful to take account of prerequisites in planning and sequencing instruction); 11 (There is an essential relationship among objectives, instruction and evaluation); 12 (... much of teacher planning is never put on paper); 13 (... one can think in terms of types of learning outcomes without actually writing down behavioral objectives); and 16 (... planning begins with a mental conception of an objective, not a behavioral objective). These primary grade teachers were very emphatic about the idea of planning without putting their thought s in writing (4.67). They expressed slight disagreement with the following items: 1 and 2 (... my study of Gagne's events of instruction has helped me to plan effective instructional activities; deliver effective instruction); 4 (... my study of Gagne's taxonomy of learning has helped me to deliver effective instruction); 9 (I am careful in planning lessons to include the appropriate events of instruction that apply to the domain of learning being taught); 10 (...I incorporate the external conditions of learning that are relevant to the domain of objectives in the lesson); and 14 (What I write in my lesson plans is almost always translated into what actually occurs when I teach). It is also noteworthy that the K-1 teachers indicated slight agreement with item 18 (I really have not found the instructional design concepts and skills to be that relevant to teaching).

While the perceptions of both groups were quite similar for many items, disparities were observed for other items. Teachers of grades 3, 4 or 5 also indicated strongest agreement with items 8, 11, 13, and 16 (see above). However, a discrepancy was observed between the responses of the two groups of teachers for items 1, 2, 4, 9, 10, 12, and 18. Overall there was a tendency for grades 3-5 teachers to report more application of ISD principles, to view more positively the contributions of their coursework in instructional design to their planning and teaching, and to be less adamant in the view that much of teacher planning is never put on paper.

Additional responses to open ended questions revealed that the preservice teachers used a comprehensive approach to the planning function of teaching. In one intern's words:

> Teacher planning is a very complex process. As a teacher you have to know your students' individual strengths and needs. You have to develop strategies to teach concepts according to those needs (positive planning); evaluate and re-evaluate strategies; study knowledge you want to teach, know prior knowledge that is needed in order to learn new info. What you want your children to learn should be noted (process and product you would like to see) and then evaluate to see if this happened...

A potentially important insight into another facet of certain teachers' planning is conveyed by this response to the question, "Did the way in which you used objectives in your general planning and specifically in your written lesson plans change over the course of your student teaching semester?:

> When integrating our subjects we would first pick out the concept we felt to be important and those we wanted to teach. Through those concepts we developed our goals, objectives, activities, etc. For example the concept, 'conflict': Social Studies - Revolutionary War; Math - Math Sandwich Shops; Health : Independent Me; Literature -Mrs. Frisby and the Rats of Nimh.

The thematic approach to teaching described here seems to place more emphasis on the goal of achieving interdisciplinary learnings. It suggests a more holistic , less discrete view of the outcomes of instruction. The whole language approach that is currently widely advocated for teaching the language arts curriculum is yet another example of a general teaching methodology embedded in a philosophy of teaching and learning that emphasizs the integrated, holistic, constructivist nature of learning.

The essential nature of mental planning either in tandem with or in lieu of more formal written lesson planning was repeatedly underscored. Here are three responses to the questions: "Do you engage in mental planning? Describe how you do this type of planning.

> Mental planning takes up to 75% of your time if you are interested or concerned about how you teach. A continual recording in your mind runs about how students will react, what you need to remember, etc.

Another teacher expressed it this way:

> I would say that I am always mentally planning but I am a person who has to put things on paper in order for them to make sense. ...I was constantly revising and editing my plans. It is a constantly changing situation that almost forces one to plan with every free moment's thoughts.

And this teacher's comment underscores the importance of mental planning and the urgency (or perhaps , impatience with planning) that some teachers bring to their work:

> Yes, most definitely - I can explain things verbally much better than trying to write down what all I'm thinking about. I think about an objective, or task which must be performed, learned. Form different activities that would enhance this learning. Write them down. Form a type of test idea that would show how much learning has occurred. Then make notes - Do it!

DISCUSSION What emerges from these data is a picture of teachers who are planful, organized and very concerned, as one would expect, with the most salient aspects of teaching: a) the learners, and b) the teaching activities - with getting the work done. While there were several comments made about the inefficiency and questionable utility of writing detailed objectives or detailed lesson plans, these preservice teachers made many references to their use of objectives in planning. They are very cognizant of the complexities of their work and of the necessity of taking into account a number of critical variables when planning. Although they may not consistently plan according to a linear ID model, most reported that they systematically considered crucial planning variables and in general described their mental planning in terms of a systems

view of teaching. For example, consider this intern's statement:

> I feel strongly that a teacher has to plan very diligently for the students to be successful. However, I don't feel that an objective has to be written in a formal form for learning to take place. Maybe I do things backwards - I always think about my students' learning and where I want them to go and what I want them to get out of it, but (as I sit back) I think I just do it in a different order.

Thiagarajan (1976) makes a similar point in arguing for the acceptability of a more flexible application of the systems approach to the design of instruction. This seems particularly appropriate for the fluid world of the classroom teacher.

Several other findings are noteworthy. At least during the highly self-conscious period of their student teaching experience, these interns incorporate some aspects of formative evaluation. This is evidenced by their propensity for regular reflection on their instructional successes and mishaps; and a readiness, if not a definite expectation, for revising their instructional activities. Also, written objectives give way to time constraints and to the primacy of mental planning, with brief notes being used as cues for teaching. Lastly, it is quite apparent that the preservice teachers in this small sample consistently placed a high premium on attending carefully to their learners as they engaged in the process of planning. As one student remarked, "I determine the needs of the student and seek to engage in learning activities that will effectively meet those needs."

To better understand these preservice elementary teachers' overriding concern for learner characteristics, it is relevant to recall Walter Dick's observation (1981) in an article about future trends and issues in instructional design:

> Most instructional design models are intended to have broad application. Therefore, they are not specific to any content or to any particular set of learners or instructors. As such, instructional design models (and instructional designers) sometimes give the appearance of ignoring the role of the student and the teacher in the learning process. It may be hypothesized that in the decade ahead there will be more emphasis on the people who implement the learning system. Emphasis will be manifested in terms of a greater knowledge of the general characteristics of the learners who are being served - their motivations, their learning habits, and their preferences. Designers will avoid the stereotypes of learners and work directly with them. (p.32)

This prediction for instructional designers may in fact characterize the everyday reality of elementary school teachers. Certainly the image that emerges of preservice elementary education teachers from their cognitive maps and from self-reports of their mental planning behavior constitutes a strong affirmation of Dick's earlier insight.

One certainly gains a renewed appreciation of the complex and cognitively demanding nature of good teaching. Teacher planning is without question a broad and complex topic that requires the integration of a number of elements including lesson planning. In conceptualizing planning, teachers must consider how they integrate all of the complexities of a classroom environment as they grapple with how to arrange the conditions and experiences to best promote the learning of diverse students.

It is gratifying to see that most of these novice teachers' cognitive maps and self-report data reveal a systematic quality to their planning behavior. The language of several of these teachers, but certainly not all, is consistent with the principles and general process of ISD. It would be desirable to conduct a more fine-

grained analysis of the qualitative differences in how teachers plan, and to also search for relationships between teachers' planning and student outcome variables.

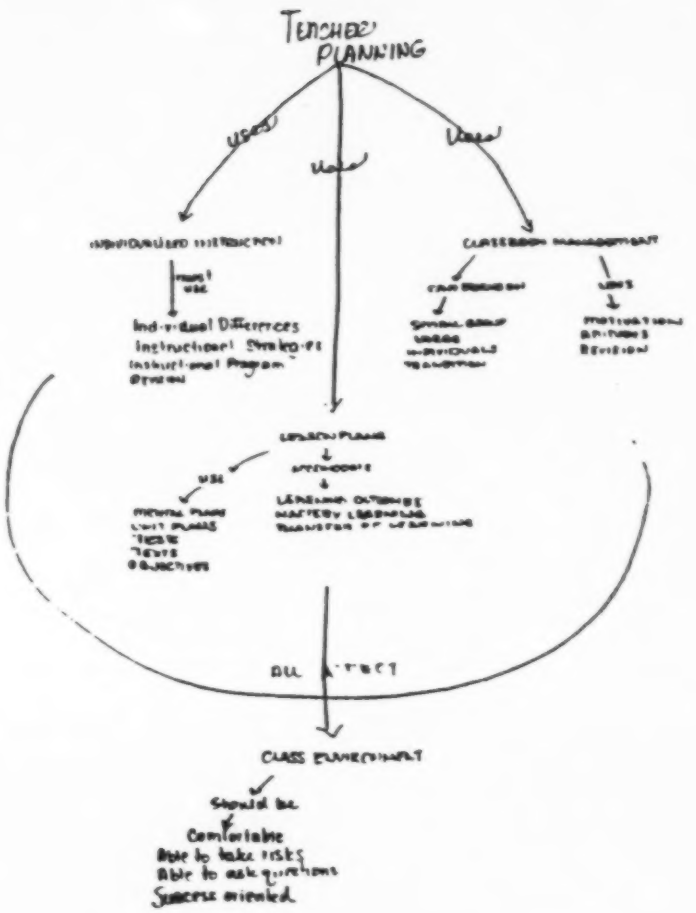
What is also of interest is that several students claimed not to see much benefit from having studied instructional systems design. This was the case even for some students whose descriptions of their own behavior indicated that they *were* indeed applying a basic ISD model in their planning. How to reconcile the perception that ISD principles lack utility for them as teachers is a puzzle. Perhaps some students confuse form with process, that is, they come to see an ISD model and the formal planning and products of their instructional design classes as the form that they must attempt to emulate rather than a process that can guide their thinking and planning for instruction.

Reigeluth (1983) makes a distinction between instructional design theory and learning theory when he states that the former "...must include specific instructional method variables;" and is therefore relatively easy to apply in the classroom. On the other hand he claims that learning theory is typically difficult to apply because it lacks specificity and leaves it to the teacher to devise the specific applications of instruction. I believe this distinction, while somewhat overstated, has merit in aiding our understanding of why some teachers reject or claim to reject their training in instructional design.

We need to acknowledge and help preservice teachers understand that ISD can be a valuable tool if it is used as a heuristic for planning systematically, rather than being perceived as an absolute and mechanistic formula for instructional planning that is out of touch with the realities of their classrooms. In short, we must do a better job of translating and modifying the essential elements of the ISD process in order to make it efficient and effective for teachers at all levels, and compatible with teachers' perceptions of the imperatives of teaching.

FIGURE 1

Map 1a

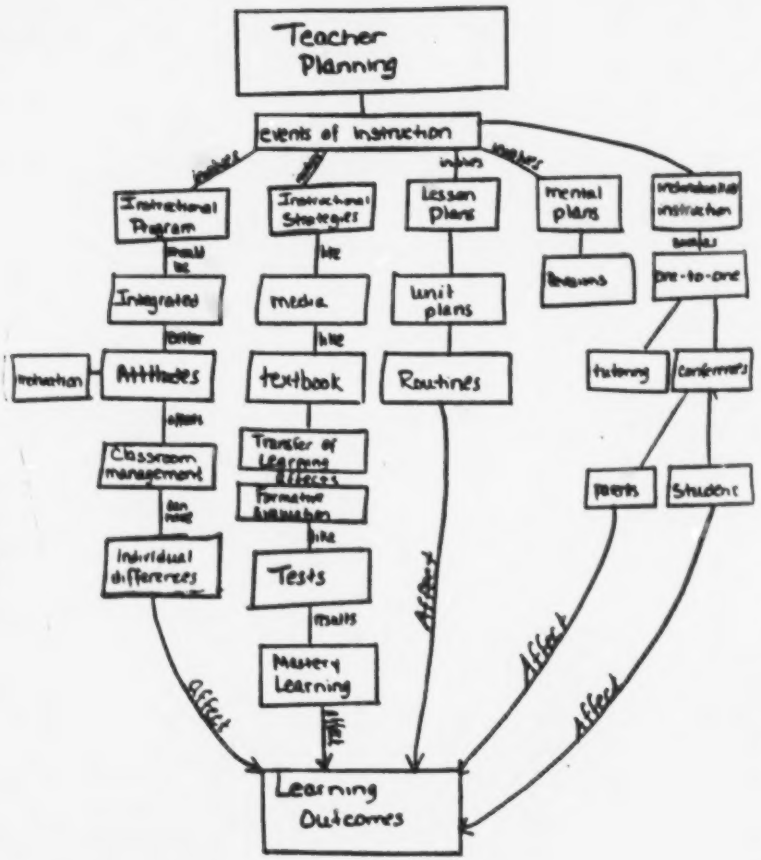


Map 1b

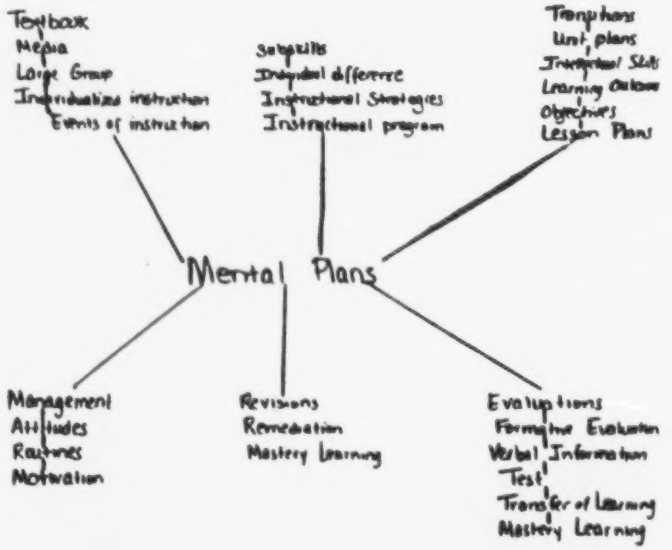
BEST COPY AVAILABLE

008

FIGURE 2



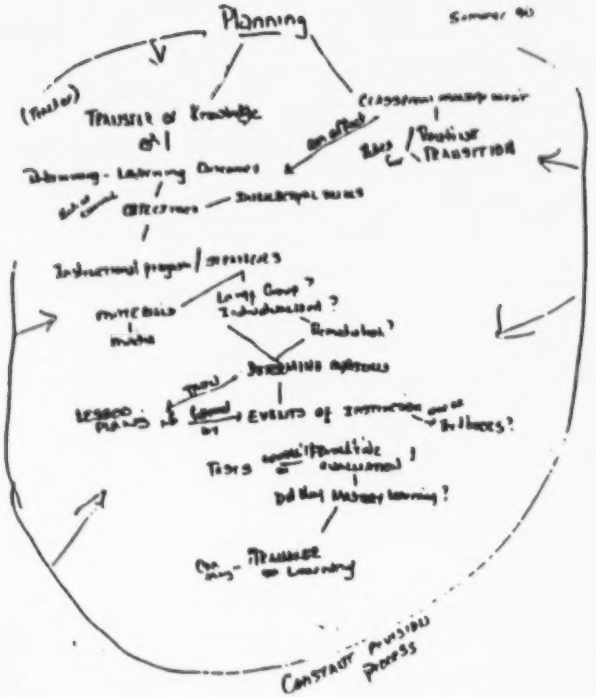
Map 2a



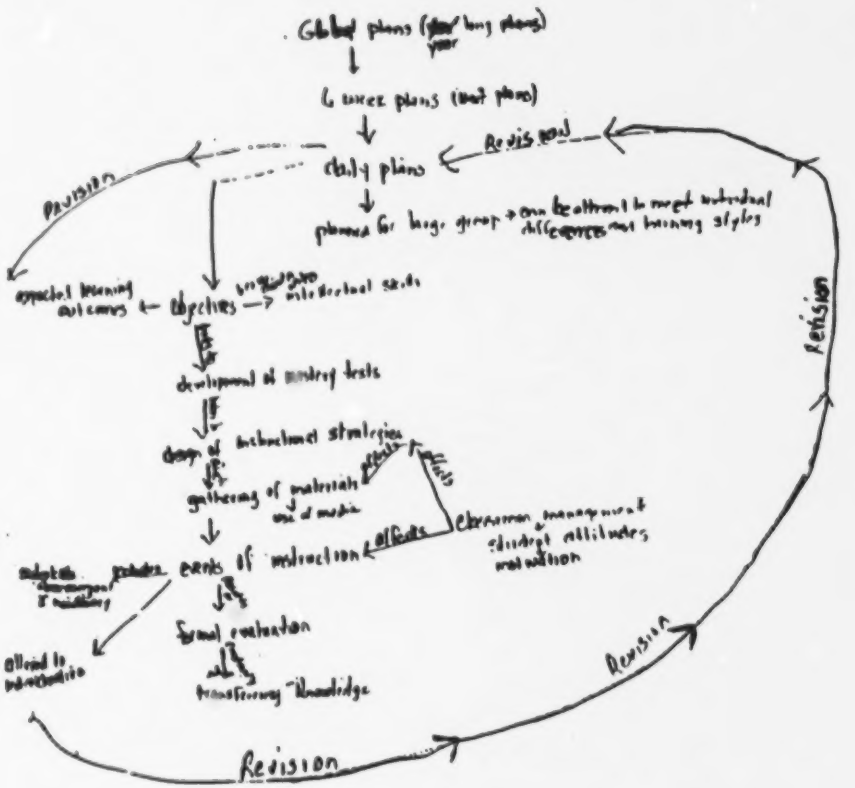
Start off with Mental Plans - Big areas of starting off. Events of instruction, Instructional Program, Lesson Plans, Management, Revisions and Evaluations. Then I have each subdivision broken down with what should be included.

Map 2b

BEST COPY AVAILABLE



Map 3a



Map 3b

FIGURE 3

BEST COPY AVAILABLE

TABLE 1

Item No.	k-1 Mean	3-5 Mean	Item No.	k-1 mean	3-5 mean
1	2.67	3.67*	10	2.83	3.83*
2	2.83	3.83*	11	4.50	4.83
3	3.17	3.50	12	4.67*	3.67
4	2.67	3.50*	13	4.33	4.00
5	3.50	3.50	14	2.67	3.83
6	3.67	3.67	15	3.17	3.83
7	3.17	3.33	16	4.33	4.00
8	4.33	4.67	17	3.67	3.33
9	2.83	3.67*	18	3.50*	2.33

*Items 1, 2, 4, 9, 10, 12 and 18 are starred to indicate discrepancies between the means of the two groups of teachers. A significant difference (.05 level) was found for item 4 (t= 2.704).

References

Beyerback, B.A., & Smith, J.M. (1990). Using a computerized concept mapping program to assess preservice teachers' thinking about effective teaching. Journal of Research in Science Teaching, 27, 961-971.

Bielby, A.E. (1974). Instructionl development in the public schools - whose job? Educational Technology, 14, 11-16.

Brown, D.S. (1988). Twelve middle-school teachers' planning. The Elementary School Journal, 89, 69-87.

Clark, C.M., & Peterson, P.L. (1986). Teachers' thought processes. In M.C. Wittrock (Ed.), Handbook of Research on Teaching. New York: MacMillan Publishing Company.

Dick, W. (1981). Instructional design models: Future trends and issues. Educational Technology, 21, 29-32.

Dick, W. and Carey, L. (1985). The systematic design of instruction. (2ed) Glenville, IL: Scott Foresman & Co.

Dick, W. and Reiser, R.A. (1989). Planning effective instruction. Englewood Cliffs, NJ: Prentice-Hall.

Earle, R.S. (1985). Teachers as instructional designers. Educational Technology, 15, 15-18.

Jonassen, D.H. (1987). Assessing cognitive structure: Verifying a method using pattern notes. Journal of Research and Development in Education, 20, 1-14.

Jonassen, D.H., Beissner, K., Kenny, R., Jost, K., Reid, D., & Yacci, M. (1990). Conveying, assessing, and learning (strategies for) structural knowledge. In M.R. Simonson and C. Hargrave (Eds.) Proceedings of Selected Research Paper Presentations at the 1990 Convention of the Association for Educational Communications and Technology in Anaheim, California.

Klein, J.D. (1991). Preservice teacher use of learning and instructional design principles. Educational Technology Reserch & Development, 39, 83-89.

Martin, B.L., & Clemente, R. (1990). Instructional systems design and public schools. Educational Technology and Research and Development, 38, 61-76..

McCutcheon, G. (1980). How do elementary school teachers plan? The nature of planning and influences on it. The Elementary School Journal, 81, 4-23.

Novak, J.D. & Gowin, D.B. (1984). Learning how to learn. Cambridge: Cambridge University Press.

Reigeluth C.M. (1983). Instructional design: What is it and why is it? In C.M. Reigeluth (Ed.), Instructional-Design Theories and Models: An Overview of Their Current Status. Hillsdale, NJ: Lawrence Earlbaum Associates, Publishers.

Stolovitch, H.D. (1980). Instructional technology and its challenge to teacher training. Performance and Instruction, 19,17-19.

Strahan, D.B. (1989). How experienced and novice teachers frame their views of instruction: An analysis of semantic ordered trees. Teaching and Teacher Education, 5, 53-67.

Thiagarajan, S. (1976). Help, I am trapped inside an ID model! Alternatives to the systems approach. NSPI Journal, 15, 10-11.

Wallace, J.D., & Mintzes, J.J. (1990). The concept map as a research tool: exploring conceptual change in biology. Journal of Research in Science Teaching, 27, 1033-1052.

Yacci, M. (1990). Assessing knowledge structures. In M.R. Simonson and C. Hargrave (Eds.) Proceedings of Selected Research Paper Presentations at the 1990 Convention of the Association for Educational Communications and Technology in Anaheim, California.

Yinger, R.J. (1979). Routines in teacher planning. Theory into Practice, 18, 163-169.